WHAT IS CLAIMED IS:

1. Apparatus of processing heavy hydrocarbon feed comprising:

a) a heater for heating said heavy hydrocarbon feed;

b) an atmospheric fractionating tower for fractionating the heated heavy hydrocarbon feed fed to the inlet of the atmospheric fractionating tower producing light atmospheric fractions and atmospheric bottoms;

c) a further heater for heating said atmospheric bottoms and producing heated atmospheric bottoms;

d) a vacuum fractionating tower for fractionating said heated atmospheric bottoms and producing light vacuum fractions and vacuum residue;

e) a solvent deasphalting (SDA) unit for producing deasphalted oil (DAO) and asphaltenes from said vacuum residue;

f) a thermal cracker for thermally cracking said deasphalted oil and producing a thermally cracked product which is recycled to the inlet of said atmospheric fractionating tower; and

g) a further thermal cracker for thermally cracking said light vacuum fractions for producing a further thermally cracked product which is recycled to the inlet of said atmospheric fractionating tower.

2. Apparatus according to claim 1 including means for supplying only the heavy portion of said light vacuum fractions to said further thermal cracker.

3. Apparatus according to claim 2 including a hydrogen donor system for processing the lighter portion of said light vacuum fractions and producing a hydrogen donor stream, said hydrogen donor system including:

a) a hydrotreater for producing a treated hydrocarbon feed from said the lighter portion of said light vacuum fractions;

b) a still further heater for producing a heated, treated hydrocarbon stream;

c) a further atmospheric fractionating tower for fractionating said heated treated hydrocarbon stream for producing further light atmospheric fractions and further atmospheric bottoms;

d) an additional heater for heating said further atmospheric bottoms and producing heated, further atmospheric bottoms; and

e) a further vacuum fractionating tower for fractionating said heated, further atmospheric bottoms and

producing further lighter vacuum fractions and further vacuum residue such that the heavier portion of said further lighter vacuum fractions or hydrogen donor stream is supplied to said thermal cracker.

4. A method for processing heavy hydrocarbon comprising the steps of :

a) heating said heavy hydrocarbon;

b) fractionating the heated heavy hydrocarbon feed in an atmospheric fractionating tower for producing light atmospheric fractions and atmospheric bottoms;

c) heating said atmospheric bottoms for producing heated atmospheric bottoms;

d) fractionating said heated atmospheric bottoms in a vacuum fractionating tower for producing lighter vacuum fractions and vacuum residue;

e) solvent deasphalting said vacuum residue in a solvent deasphalting (SDA) for producing deasphalted oil (DAO) and asphaltenes;

f) thermally cracking said deasphalted oil in a thermal cracker for producing a thermally cracked product which is recycled to the inlet of said atmospheric fractionating tower; and

g) thermally cracking said lighter vacuum fractions for producing a further thermally cracked product that is recycled to said atmospheric fractionating tower.

5. A method according to claim 4 providing a further, separate thermal cracker for thermally cracking said lighter vacuum fractions.

6. A method according to claim 5 including providing means for supplying only the heavy portion of said light vacuum fractions to said further thermal cracker.

7. A method according to claim 4 wherein said lighter vacuum fractions are thermally cracked in the same thermal cracker in which said deasphalted oil is thermally cracked.

8. A method according to claim 4 including:

a) providing a hydrotreater for processing said light atmospheric and the lighter portion of said light vacuum fractions and producing a treated, hydrocarbon stream;

b) heating said treated hydrocarbon stream for producing a heated, treated, hydrocarbon stream;

c) fractionating said heated, treated, hydrocarbon stream using a further atmospheric fractionating tower for producing further light atmospheric fractions and further atmospheric bottoms;

d) heating said further atmospheric bottoms for producing heated, further atmospheric bottoms;

e) fractionating said heated, further atmospheric bottoms using a further vacuum fractionating tower for producing further lighter vacuum fractions and further vacuum residue; and

f) thermally cracking the heavier portion of said further lighter vacuum fractions.

9. A method according to claim 7 including:

a) providing a hydrotreater for processing said light atmospheric and the lighter portion of said light vacuum fractions and producing a treated, hydrocarbon stream;

b) heating said treated hydrocarbon stream for producing a heated, treated, hydrocarbon stream;

c) fractionating said heated, trc, hydrocarbon stream using a further atmospheric fractionating tower for producing further light atmospheric fractions and further atmospheric bottoms;

d) heating said further atmospheric bottoms producing heated, further atmospheric bottoms;

e) fractionating said heated, further atmospheric bottoms using a further vacuum fractionating tower for producing further lighter vacuum fractions and further vacuum residue; and

f) supplying the heavier portion or hydrogen donor stream of said further lighter vacuum fractions to said thermal cracker.

10. Apparatus according to claim 1 including:

a) a hydrotreater for processing the lighter portion of said light vacuum fractions and producing a treated, hydrocarbon stream;

g) a further heater for heating said treated, hydrocarbon stream for producing a heated, treated, hydrocarbon stream;

b) a further atmospheric fractionating column for producing from said heated, treated, hydrocarbon stream further light atmospheric fractions and further atmospheric bottoms;

c) a still further heater for heating said further atmospheric bottoms producing heated, further atmospheric bottoms; and

d) a further vacuum fractionating column for producing further lighter vacuum fractions and further vacuum residue such that the heavier portion of said further light vacuum fractions is supplied together with said deasphalted oil to said thermal cracker.